BRANNAN
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Founded 1906

To: Eric Scott, Environmental Protection Specialist
Division of Reclamation, Mining and Safety
1313 Sherman St., Room 215
Denver, CO 80203

From: Steve Kelton (skelton@brannan1.com)

Subject: Operator's Response to Adequacy Review, Morton Lakes (M-2008-082), concerning slurry wall installation

Date: March 9, 2023

Thank you for your review of TR-8 at the Morton Lakes site.

A technical response is attached, addressing the numbered questions in your February 24th letter. The Operator understands and concurs that groundwater modeling and other hydrogeologic evaluation may benefit from back-and-forth clarification, given the highly technical nature of the questions presented. In general, the attached response from Bishop-Brogden Associates (BBA) clarifies that the modeling and analysis conducted to date adequately addresses questions of hydrologic balance.

The water development post-mining use and associated reclamation plan have been approved since the inception of the Morton Lakes operation. This river bottom location is strategically important for exchanges and delivery of developed water, and the post-mining use is already being implemented as concurrent reclamation allows. Both on-the-ground experience and previous studies of hypothetical well impacts attributed to slurry walls have not yielded any evidence that slurry walls and planned water storage reclamation will significantly impact groundwater functions in the surrounding area.

As detailed in the BBA response, the expected changes in the groundwater regime are confined to the affected land and its immediate surroundings and, in effect, are not changes to quantity (or quality) but are instead slight changes in elevations (i.e., hydraulic gradient) where slurry walls redirect groundwater flows. This alluvial floodplain historically receives a large quantity of water and retains the capacity to move that water with rocks, boulders, building foundations and other navigational meandering introduced as part of the built environment.

No effect on recharge facilities is expected. In the immediate vicinity of the Morton Lakes operation, only the Lupton Bottom Ditch, at points downstream of Reservoirs 4A and 4B (Stage 7A and 7B), has any designated recharge facilities. While those facilities should not be relevant to the scope of TR-8, the amplitude of groundwater variation (i.e., 1.3 feet of mounding, facing

upgradient) simply does not indicate that there is any possible converging effect at the Lupton Bottom Ditch's downstream facilities.

For your consideration, it is worth reiterating that there remains a complete absence of evidence that slurry walls at the Morton Lakes site will result in a disturbance to the hydrologic balance or a disturbance to the quantity or quality of water in the surface and groundwater systems.

Based on the detailed response to questions and the evident compliance of TR-8 and the M-2008-082 with all applicable rules, we urge the Division to elaborate on the nature of any perceived deficiency relative to the Reclamation Act and the Construction Materials Rules. Reviewing Rule 3.1.6(1), the Operator finds that (a) there is no injury to water rights in the record or indicated by modeling, (b) the site has a CDPS permit and complies with all water quality regulations, (c) no dredge and fill (i.e., 404/wetland) issues are alleged or indicated and (d) siltation structures are not an issue at the Morton Lakes site. At this time, we are unaware of any substantial barrier to approval of the TR-8 according to the standard schedule set forth in Rule 1.9.1.

Enclosed: BBA Technical Response, dated March 9, 2023

BBA
Water Consultants, Inc.

Christopher J. Sanchez
Jeffrey A. Clark
Daniel O. Niemela
Jonathan D. George
Kristina L. Wynne
Austin P. Malotte
Michael A. Sayler
Charles E. Stanzione

March 9, 2023

Steve Kelton
Ready Mixed Concrete Company, LLC
2500 Brannon Way
Denver, CO 80229

RE: Permit M2008-082; Morton Lakes; Technical Revision 8 (TR8) – Revisions to Mining Plan for Installation of Slurry Walls 7A and 7B with Ground Water Impact Modeling Report and Surety Increase Request - Response

Dear Mr. Kelton:

We are writing to provide a response to the Division of Reclamation, Mining and Safety's (DRMS) February 24, 2023 letter requesting additional information regarding the Morton Lakes Stage 7A and 7B slurry wall impact investigation prepared by this office.

Background

As you are aware, slurry walls are proposed for the Stage 7A and 7B gravel pits at the Morton Lakes mine site. The DRMS requested a hydrogeologic investigation of the impact of the proposed slurry walls on the hydrogeologic system around the gravel pits and the mine site. Our investigation focused on the potential impact to ground water elevations in the South Platte River alluvial aquifer as well as the impact to flow paths through the aquifer as they relate to alluvial underflow and return flow concerns stated by the State Engineer's Office (SEO). Our analysis was based on an existing MODFLOW model that was modified to model the existing and proposed Stage 7A and 7B gravel pit liners and ponds at the mine site as it was for previous slurry wall approvals through the DRMS.

Our analysis of the proposed Stage 7A and 7B slurry liner potential impacts generally found that:

- The lining of the pits will result in localized mounding and shadowing effects.

- Ground water mounding is projected to occur in areas around the proposed slurry walls, elevating water level elevations by as much as approximately 1.3 feet compared to pre-slurry wall conditions.

- Ground water shadowing is projected to occur in areas downstream of the proposed slurry walls with water level elevations depressed by as much as approximately 2.0 feet compared to pre-slurry wall conditions.

- Ground water will not be exposed at the surface as a result of the proposed Stage 7A and 7B slurry walls.

- The existing ground water flow paths in the general area around the mine site will not be significantly impacted and local ground water will still communicate with the South Platte River.

Response to DRMS Request for Additional Information / Clarifications

Our response to the DRMS's request for additional information has been formatted to match the numerical order of the requests made in DRMS's February 24, 2023 letter, generally summarizing and then responding to the request.

1. The DRMS requested clarification regarding whether the modelling considered only the Stage 7A and 7B gravel pit slurry walls or considered all of the Morton Lakes mine site slurry wall lined gravel pits and existing unlined ponds.

    a. The MODFLOW model prepared to investigate the impacts of the Stage 7A and 7B gravel pit liners includes features to model all of the Morton Lakes mine site slurry wall lined gravel pits and existing unlined ponds. The attached Figure 1 presents the general locations of these areas. The model was, however, prepared to investigate the potential impact of the addition of the Stage 7A and 7B gravel pit slurry walls. Accordingly, the pre-lining condition model run was performed with all of the existing slurry walls and ponds except for the Stage 7A and 7B liners. The Stage 7A and 7B liners were added to subsequent model runs to investigate the impact of the addition of the proposed liners to the existing system.

2. The DRMS may require model revisions and additional model runs if the modelling only investigated the installation of the Stage 7A and 7B slurry walls.

    a. The MODFLOW model was prepared to investigate the addition of the Stage 7A and 7B gravel pit slurry walls, so it only considers the new impact of those features. The MODFLOW model does, however, include all of the proposed and existing liners as this is the last gravel pit at the Morton Lakes mine site to be lined and mined. We believe the model was prepared in a manner that meets the intention of

the DRMS's request that the model consider all future impacts of the mine site, as currently approved.

3. The DRMS requested rationale for including Little Dry Creek in the model, but not the Lupton Bottom Ditch, which also flows through the site.

   a. The MODFLOW model intentionally did not include the Lupton Bottom Ditch.

   b. Ditch flow is temporal and ephemeral. The MODFLOW model is operated as a steady state change model where a background condition is identified, a change is applied and that change is analyzed. The model was not intended to include features with seasonality (flows at times and does not flow at other times).

   c. The ditch will have limited communication with the alluvial aquifer. Ditches are designed to transmit water from the diversion point to the place of use. Although we recognize that ditches do leak, the communication and impact on the alluvial system is less than that of a river, stream or creek.

4. The DRMS has requested additional detail regarding how the model addresses the SEO's previous concerns regarding the impact of the slurry walls on return flows from regional recharge projects communicating with the South Platte River.

   a. We discussed concerns regarding the impact of the gravel pits on return flows with the SEO and understand that their concern is whether the lining of the gravel pits could block recharge water (or other alluvial underflow) from interacting with the South Platte River.

   b. The SEO and our office discussed the design of the slurry walls (closed areas around the pits), whether there were any recharge projects of specific concern and the general potential impact of the slurry walls on ground water flow. We understood that the SEO was no longer concerned with the potential slurry wall impact to underflow and South Platte River interaction after our discussions.

   c. The model addressed the SEO concerns by investigating the impact of the proposed slurry walls on ground water flow paths around the mine site. The review of the pre- and post-lining ground water elevations around the pit areas as suggested by the model shows that before and after the lining, ground water flows around and through the mine area similarly. Ground water flows will not be cut off from interacting with the South Platte River as a result of the gravel pits.

   d. The SEO did identify three recharge projects with water right locations in the general area of the mine site.

i. WDID 0202032 – Lupton Bottom Wright Recharge Area – The State has identified this structure as an "inactive structure which physically exists, but no diversion records are maintained" as indicated in the State's water right information. The State indicates that the structure could be used in the future.

ii. WDID 0202124 – Lupton Bottom Central in Ditch - The State has identified this structure as a "non-existent structure with no contemporary or historic record" as indicated in the State's water right information.

iii. WDID 0202133 – Lupton Bottom Central in Ditch - The State has identified this structure as a "non-existent structure with no contemporary or historic record" as indicated in the State's water right information.

e. Even if the Lupton Bottom Ditch were used for a recharge project the recharge would occur over the length of the ditch and the slurry walls would not restrict the ditch from recharging water to the South Platte River.

f. Additional recharge structures were identified downstream from the mine site, but the slurry walls will have no impact on downstream recharge projects from interacting with the South Platte River.

g. Figure 4 from our original summary may have inadvertently been excluded from our original submittal. We have reattached our technical summary with Figure 4 attached for clarity. The comparison of Figure 3 and Figure 4 from that summary provides the comparison of the pre- and post-lining water level conditions.

5. The DRMS has requested additional details regarding model inputs and their justifications, including a map of the entire model domain.

a. The details of the model were presented in our December 21, 2022 memorandum summarizing the hydrogeologic investigation. Maps presenting the entire model domain have been included as requested and discussed below.

b. A summary of the model inputs has been summarized in the table below with the basis and general justification for each model input.

Input	Value	Basis	Justification
Ground Surface, Aquifer Top and Bedrock Elevations	Varied	-SPDSS maps of ground surface, water level and bedrock elevations -Onsite Monitoring Well Data	-Prepare model to match real world conditions -Maps cover full model domain -Published data used by ground water professionals
No Flow Boundaries to define edge of alluvial aquifer	No Flow Cells Included in Model	-SPDSS Mapping	-Common modelling approach to define edge of an alluvial aquifer
No Flow Boundaries to model slurry wall locations	No Flow Cells Included in Model	-Aerial Photography -Construction Information Provided by client	-Slurry walls remove portions of the aquifer -No flow boundaries allow for no communication -Common modelling approach
Head dependent Cells to model alluvial aquifer	Varied	-SPDSS Mapping	-Common modelling approach to allow for the aquifer to react to model features and applied changes for investigation
Upstream and Downstream Constant Head Boundaries	Varied	-SPDSS Mapping	-Common modelling approach to model alluvial underflow
River Cells	Varied	-Aerial Photography	-Common modelling approach to model stream rivers and creeks -Estimated river characteristics
Hydraulic Conductivity (K)	770 ft/day	-SPDSS data points	-The model needs a K value to calculate transmissivities and to allow for the aquifer to react to applied changes for investigation
Specific Yield	0.20	-Assumed value based on commonly accepted alluvial aquifer characteristics	-Commonly accepted value

6. The DRMS has requested additional details regarding the use of the model without full calibration, including A) attempts that were made to calibrate the model and the data that would be required for full calibration, B) how calibration or non-calibration may affect result validity, and C) are there any weakness to the model because of the lack of full calibration.

   a. For clarification, calibration of a model is the process of modifying specific details in the model such that model results better match observed conditions. The model used for this effort was calibrated manually such that modelled saturated thickness values would better match those suggested by limited well data. The calibration of the model to suggested saturated thicknesses is important because the thickness of the aquifer impacts the transmissivity, water levels and ground water flow. To "fully-calibrate" the model (meaning to use inverse modelling and statistical analysis relying on UCODE within MODFLOW), we would need more observations of actual, current conditions and would need to include additional features based on those observations within the model for UCODE to target for calibration. We simply lack the data from the available record to perform that type of calibration. To revise the model to allow for full model calibration, the model would require additional details and observations for which information is not fully available to support. Additional data and observations may include: 1) water levels collected from wells throughout the model domain all at the same time, 2) stream infiltration measurements and monitoring, 3) precipitation data, 4) irrigation and crop use data, 5) phreatophyte locations and consumption, 6) locations of shallow ground water that may interact with phreatophytes, 7) stream flow data, and 8) information regarding potential alluvial and bedrock aquifer interactions, for example. This data is not available to us or our client for use in this effort at this time.

   b. Again for clarity, the model was calibrated manually, just not through UCODE in MODFLOW. Accordingly, the model was refined during its preparation to provide more accurate results. An uncalibrated model may provide less meaningful model results if the model does not reflect the ground water system it is modelling. The model used for this effort was reviewed and refined during its preparation phase to more accurately reflect the ground water system at and surrounding the mine site to the extent feasibly possible.

   c. The weaknesses of an uncalibrated model is that if the model does not adequately represent the actual system, then the results of the model would be less meaningful for discussing projected changes in that system. The model for this effort was calibrated to adequately represent the ground water system at and around the mine site and the results for the model are meaningful for the investigation and discussion of potential changes associated with the proposed slurry liners for the Stage 7A and 7B gravel pits.

7. The DRMS has requested figures that present the following:

   a. Well locations and surface elevations / contours used to develop the model. This figure has been provided as Figure 2.

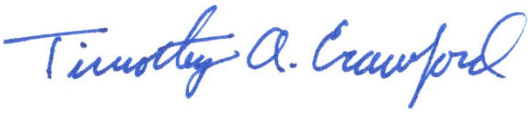
   b. The model grid utilized for the model domain. This figure has been provided as Figure 3.

   c. Pre- and post-slurry wall lining ground water elevation maps. These figures have been provided as Figure 4 and 5.

We hope that this correspondence provides the additional information regarding the Morton Lakes Stage 7A and 7B slurry wall impact investigation that the DRMS was seeking in their request. We are available to provide additional details or information regarding the model and the investigation if the DRMS has any additional requests.

Very truly yours,

BBA Water Consultants, Inc.



Timothy A Crawford, P.G.
Project Manager - Hydrogeologist

TAC/jeb
Enclosures
0430.08

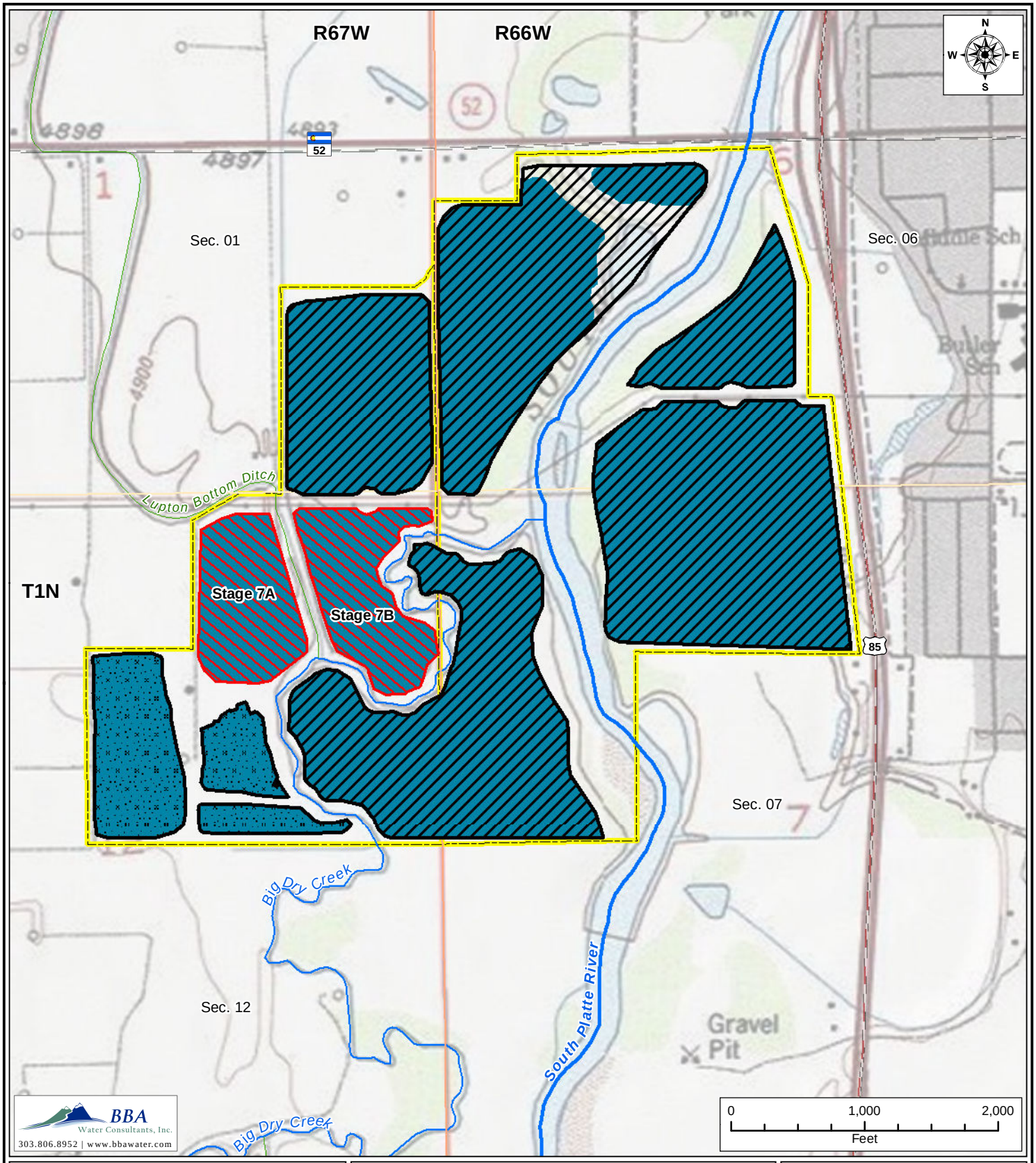


Figure 1
Brannan Sand and Gravel Company LLC Morton Lakes General Location Map

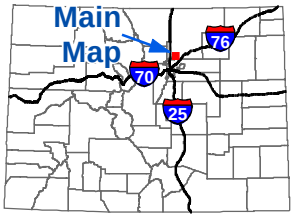
Date: 3/7/2023 | Job No. 0430.08

Legend

- Mining Stage
- Mining Stages 7A & 7B
- Morton Lakes Mine
- Slurry Wall Lined Pits
- Unlined Pond Areas

Data Source: CDSS, CDOT, BLM, USGS

COLORADO



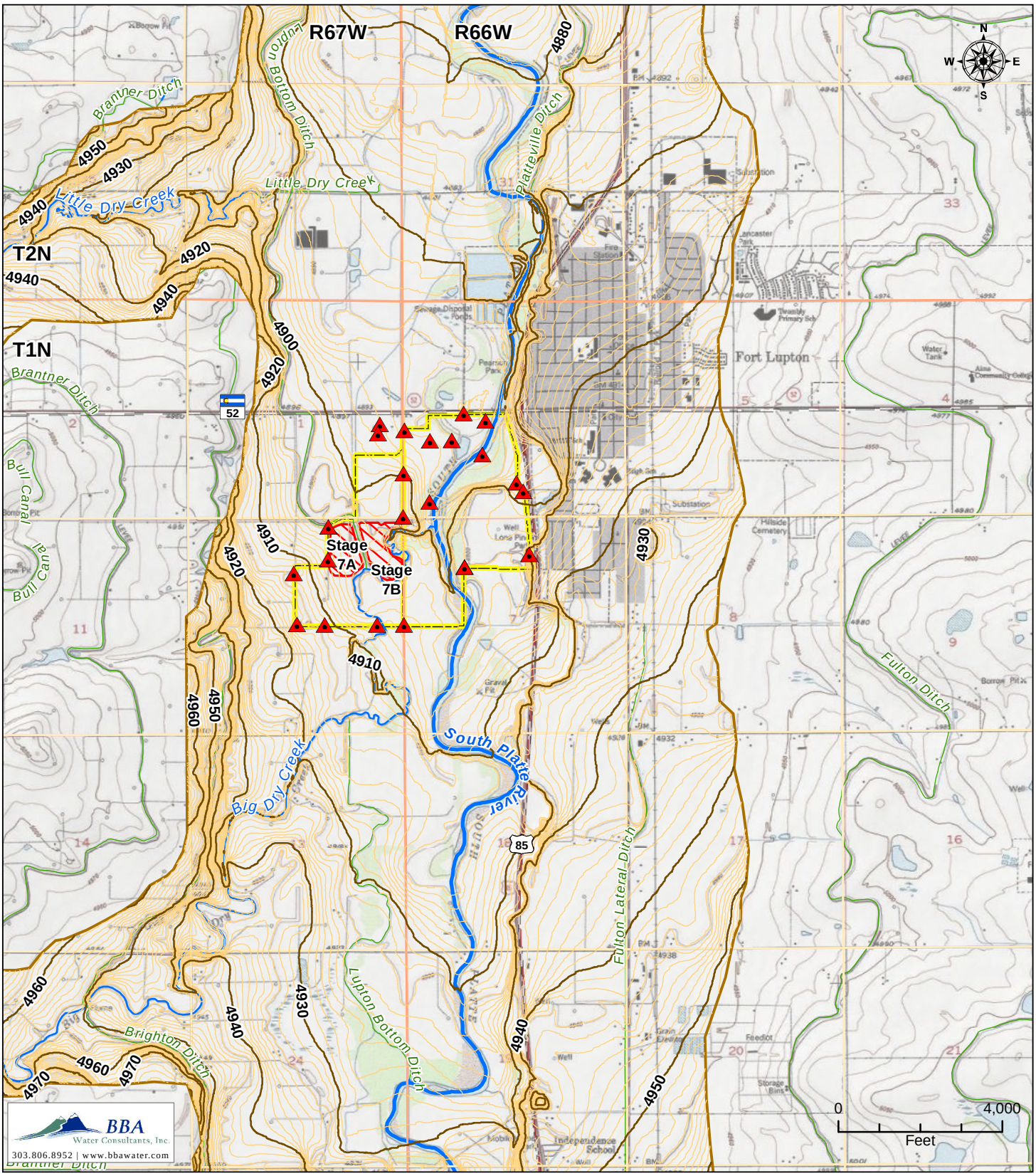


Figure 2
Brannan Sand and Gravel Company LLC Morton Lakes Surface Elevation Map

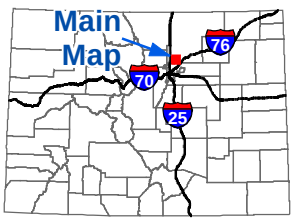
Date: 3/7/2023 | Job No. 0430.08

Legend

- Morton Wells
- Stage 7A & 7B
- Morton Lakes Mine
- Modeled Saturated Alluvium (Approx.)
- 10-Ft. Contour - Surface Elevation
- 1-Ft. Contour - Surface Elevation

Data Source: DWR, RMCC, CDOT, USGS, BLM

Colorado



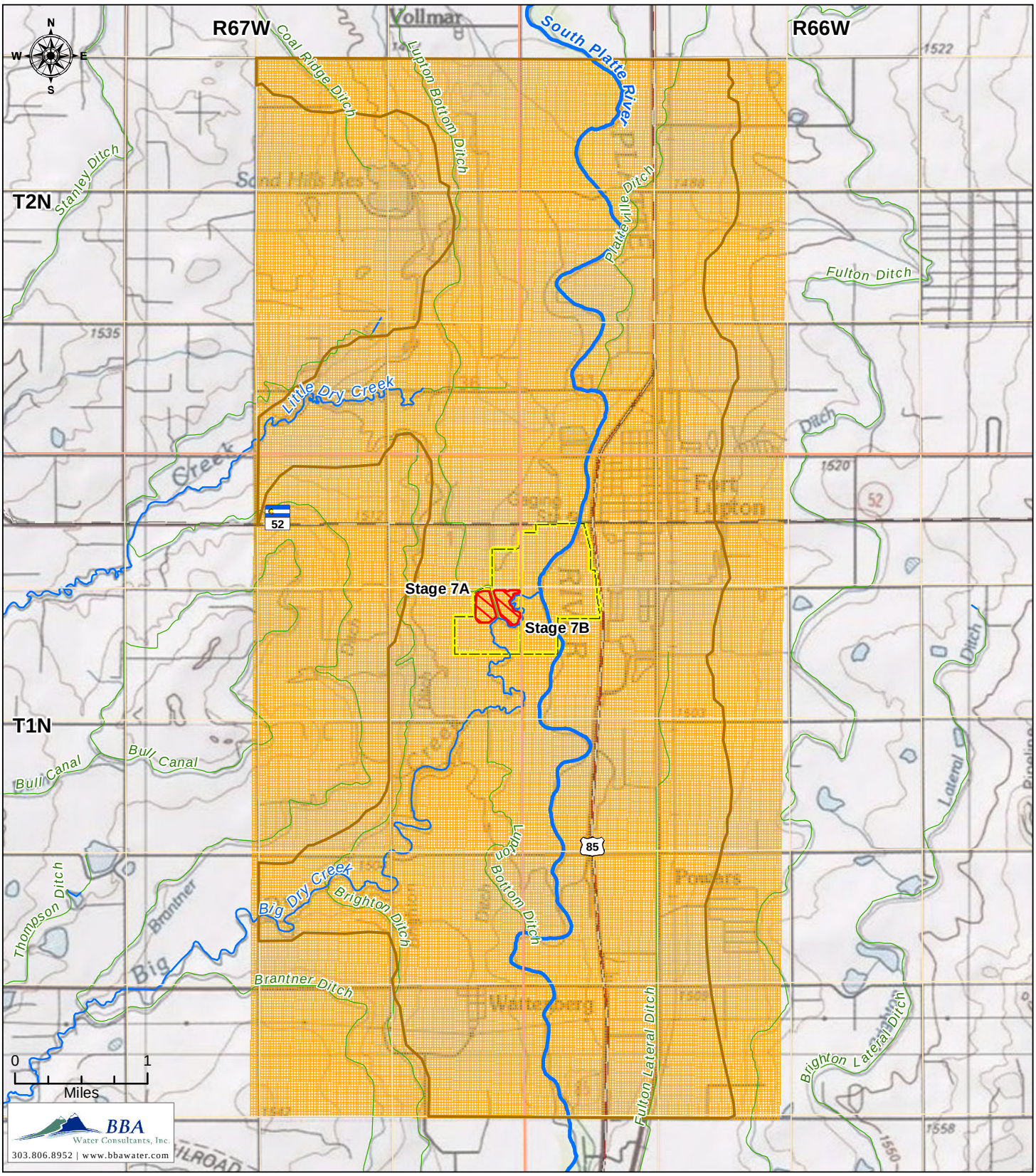


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Figure 3
Brannan Sand and Gravel Company LLC Morton Lakes Model Grid

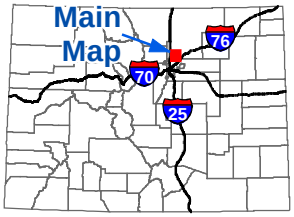
Date: 3/7/2023 | Job No. 0430.08

Legend

- Model Grid
- Stage 7A & 7B
- Morton Lakes Mine
- Modeled Saturated Alluvium (Approx.)

Data Source: DWR, RMCC, CDOT, USGS, BLM

Colorado



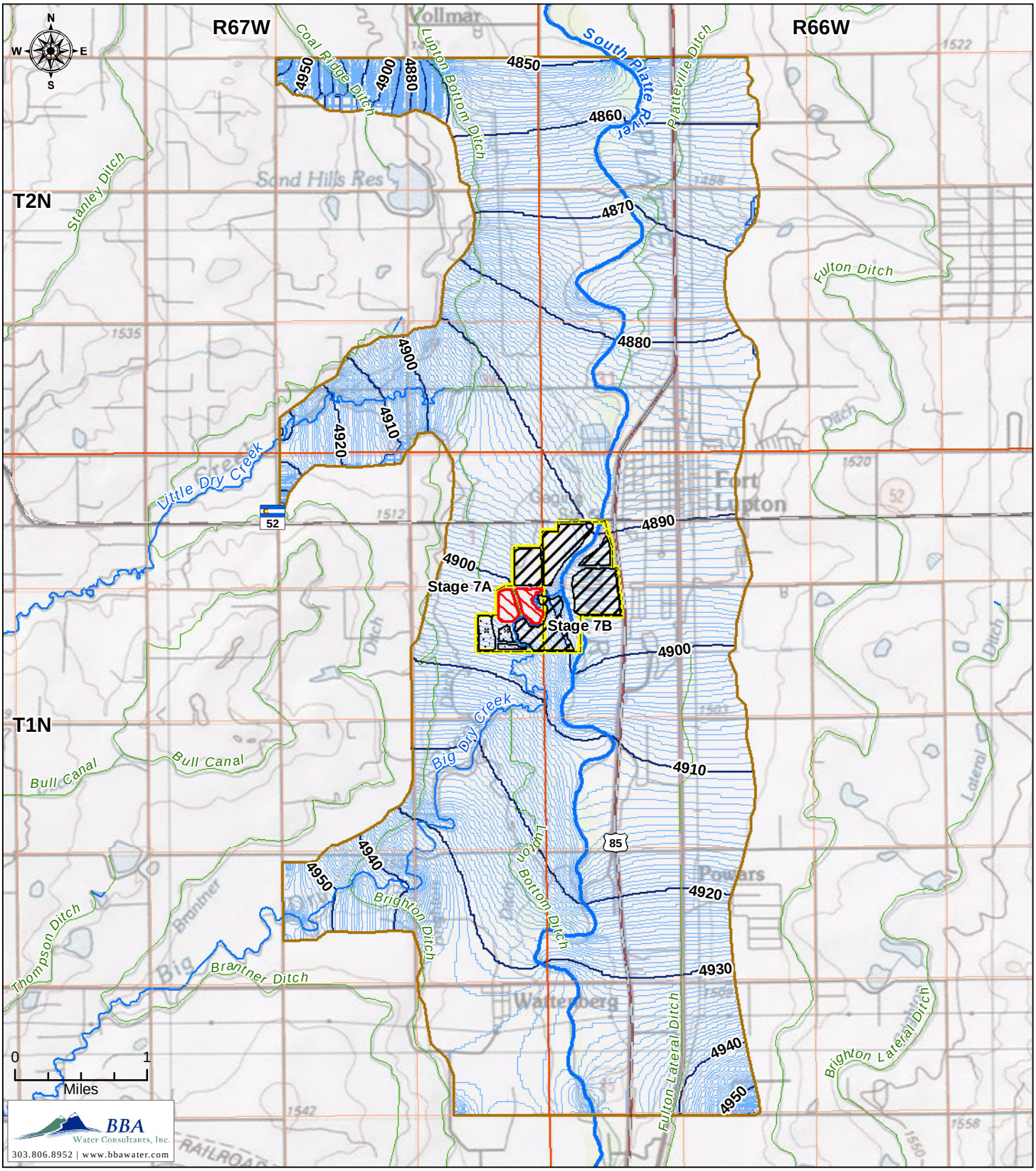


Figure 4
Brannan Sand and Gravel Company LLC Pre-Lining Water Level Elevation Map

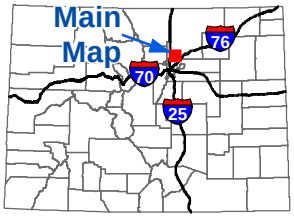
Date: 3/8/2023 | Job No. 0430.08

Legend

- 0.5-Ft. WL Contour
- 10-Ft. WL Contour
- Slurry Wall Lined Pits
- Unlined Pond Areas
- Stage 7A & 7B
- Morton Lakes Mine
- Modeled Saturated Alluvium (Approx.)

Data Source: DWR, RMCC, CDOT, USGS, BLM

Colorado



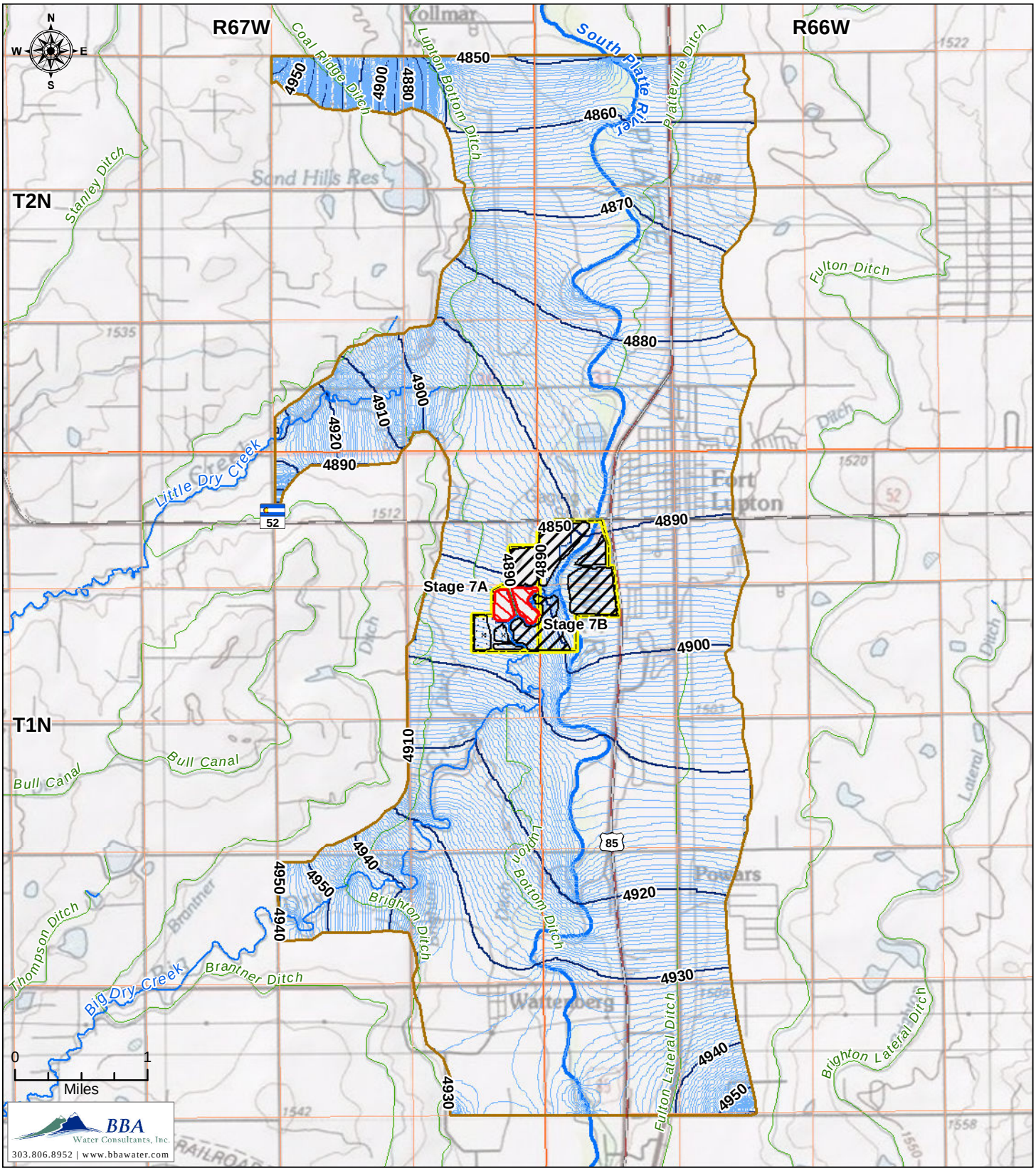


Figure 5
Brannan Sand and Gravel Company LLC Post-Lining Water Level Elevation Map

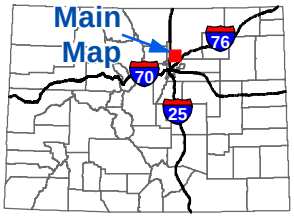
Date: 3/7/2023 | Job No. 0430.08

Legend

- 0.5-Ft. WL Contour
- 10-Ft. WL Contour
- Slurry Wall Lined Pits
- Unlined Pond
- Stage 7A & 7B
- Modeled Saturated Alluvium (Approx.)
- Morton Lakes Mine

Data Source: DWR, RMCC, CDOT, USGS, BLM

Colorado



MEMORANDUM

BBA Water Consultants, Inc.

To: Joe Lamanna

From: Timothy A. Crawford

Subject: Brannan Sand and Gravel Company LLC – Hydrogeologic Investigation of the Morton Lakes Site Stage 7A and 7B Gravel Pit Lining

Job: 0430.08

Date: December 21, 2022

This memorandum presents a hydrogeologic investigation of the impact of mining at the Stage 7A and 7B gravel pits at the Morton Lakes site generally located in Sections 1 and 12, Township 1 North, Range 67 West of the 6th P.M., and Sections 6 and 7, Township 1 North, Range 66 West of the 6th P.M, as shown in Figure 1. Specifically, this investigation focuses on the potential impact to ground water elevations in the South Platte River alluvial aquifer resulting from the lining of the Stage 7A and 7B gravel pits and whether subsurface ground water drains may be necessary to allow ground water to continue to flow towards and interact with the South Platte River. To analyze the potential water table elevation changes and impacts to ground water flow paths, a previously prepared MODFLOW model was utilized to model the existing and proposed gravel pit liners at the Morton Lakes site.

Background

Available geologic mapping indicates the presence of a shallow alluvium at the Morton Lakes site that consists of quaternary-aged, clay, silt and gravel. The geologic mapping indicates that the shallow alluvium overlies deeper alluvial material identified as quaternary-aged river gravel which consists of small to large pebbles and cobbles in coarse sand. Approximate terrace equivalents for this river gravel are the Broadway and Louviers alluviums. The gravel contained in these alluvial units is the target of the gravel pit mining at the Morton Lakes site. Based on geologic mapping, the bedrock below the alluvial aquifer at the site consists mainly of the Dawson Formation, a siltstone / sandstone unit of the Denver Basin.

The alluvium at the site is saturated with a general ground water gradient from south to north. The alluvium interacts with the South Platte River, Big Dry Creek and Little Dry Creek. The Stage 7A and 7B gravel pits at the Morton Lakes site will be lined similar to several of the other existing gravel pits at the site to address these saturated conditions. The gravel pits directly to the south and southwest of Stage 7A are unlined gravel pit ponds.

Available USGS geologic mapping, State Engineer well permit database information, test drilling data and South Platte Decision Support System (SPDSS) mapping and well data were utilized to identify the extent and occurrence of the South Platte River alluvium for this effort. Available SPDSS mapping reviewed for this effort included mapping of bedrock elevations, water level elevations, surface elevations and transmissivity for the general area.

MODFLOW Model

A MODFLOW model was previously prepared to analyze water level changes and impacts to the alluvial ground water system and neighboring wells as a result of the Stage 6A and 6B gravel pit dewatering and lining. This previous model has been modified to analyze the existing gravel pits and the potential impact of the lining of Stage 7A and 7B on water levels in the South Platte River alluvium and the interaction of the aquifer with the river.

A single layer MODFLOW model was utilized to represent the alluvial aquifer bounded by lower permeability bedrock present at the site.

The model domain includes approximately 32 square miles, discretized to 100-foot square cells.

Top and bottom elevations of the model cells were based on SPDSS ground surface elevation mapping, SPDSS bedrock elevation mapping, SPDSS alluvial boundary mapping and test drilling data provided by the client. SPDSS water level elevation information was used to define the initial heads in the model and to compare modeled water level elevation conditions to mapped conditions.

The model includes several boundary conditions to represent the alluvial aquifer, the South Platte River and its tributaries, the bedrock below the alluvium and the lined and unlined pits.

- The alluvial aquifer was modeled using head dependent cells.
- The bedrock was modeled using no-flow cells bounding the head dependent cells.
- Alluvial underflow was modeled using constant head boundaries at the upstream and downstream extents of the model as well as at the location of tributaries (Big Dry Creek and Little Dry Creek).
- The South Platte River, Big Dry Creek and Little Dry Creek were modeled using the MODFLOW river package to allow water to infiltrate into the alluvial aquifer. The South Platte River was modeled as a 100-foot wide channel, with a river bottom 5 feet beneath the river stage. Big Dry Creek was modeled as a 15-foot wide channel, with a river bottom 2 to 3 feet beneath the river stage. Little Dry Creek was modeled as a 10-foot wide channel, with a river bottom 2 feet below the river stage. Each of the rivers was modeled with a riverbed thickness of 1 foot and a hydraulic conductivity of 5 feet per day. The river stage for each river cell was approximately equal to the surface elevation for that cell.
- Pit lining was simulated using no flow cells.
- Ponds were simulated by increasing the hydraulic conductivity in cells at the location of the ponds.
- Recharge was not simulated in the MODFLOW model.

A hydraulic conductivity of 770 feet per day was used for the model for the alluvial material based on SPDSS data points located within two miles of the Morton Lakes boundary. A specific yield of 0.20 was used for the model based on our experience with alluvial systems.

All model simulations were run in steady state conditions. The model was first run without the Stage 7A and 7B liners to determine pre-liner ground water conditions. A model scenario that included the Stage 7A and 7B liners was then performed. Final water levels from the model scenario including the liners were compared with pre-lining conditions to determine the impacts of the pit lining.

Sufficient data was not available for the area to allow for a full calibration of the model. The model was refined by adjusting cell bottom elevations to match measured saturated thicknesses indicated by the limited well data.

Pre-lining Ground Water Conditions

Modeled ground water elevations range from a high of approximately 4,940 feet above sea level at the upstream (south) side of the model to a low of approximately 4,850 feet above sea level on the downstream (north) side of the model. At some locations along the edges of the model, "dry cells" were present indicating areas within the aquifer that are not saturated. These "dry cells" were consistent with expectations based on review of geologic and hydrogeologic information. At the Stage 7A and 7B locations, modeled depths to water level are approximately 1 to 3 feet below the ground surface with saturated thicknesses averaging approximately 35.7 feet. The modeled saturated thicknesses at the pit locations were generally consistent with the limited data for the area, but monitoring well data suggests depth to water is slightly deeper than modeled.

Gravel Pit Lining Impacts

Mounding and Shadowing Effects

The lining of the Stage 7A and 7B gravel pits during mining will have an effect on the ground water elevations around the pits causing mounding (higher water levels) in some areas around the pits and shadowing (lower water levels) in other areas around pits. The modelling indicates that water levels may mound by as much as approximately 1.3 feet in areas around the pits with the greatest mounding between Stage 7A and a neighboring unlined gravel pit pond. The modelling indicates that water levels may be shadowed between and on the downstream side of the pits by as much as approximately 2.0 feet. Figure 2 presents a map of the potential mounding and shadowing effects associated with the lining of the gravel pits. As presented, modeled changes in water level elevation are greatest centered around the location of the pit liners, as expected, with impacts generally decreasing with distance from the liners. The ground water mounding on the upstream side of the pits along Big Dry Creek is limited to approximately 0.26 to 0.5 feet and is limited by the creek which allows for water to flow as surface water downstream away from the pits as mounding occurs. Water level mounding is greatest between Stage 7A and the neighboring unlined gravel pit as ground water flows through the alluvial material between the two features. Based on the modeled water depths, existing monitoring data and the modeled mounding, ground water will not be exposed at the ground surface as a result of the lining of the pits. Ground water shadowing will also not have a detrimental impact on the ground water resource in close proximity to the pits.

Ground Water Flow Effects

The lining of Stage 7A and 7B not only has the potential to affect the elevation of the ground water table around the pits, but also the ground water flow patterns around the pits. We have investigated the potential impacts to ground water flow paths as they relate to regional ground water flow and the interaction between the alluvial ground water system and the South Platte River. Figure 3 presents an elevation map of the ground water table prior to the lining of Stage 7A and 7B and includes general indications of ground water flow paths in the vicinity of the gravel pits. Figure 4 presents an elevation map of the ground water table after the lining of Stage 7A and 7B which again includes general indications of ground water flow paths. As presented, while the lining of the gravel pits has a slight impact on ground water elevations in the vicinity of the pits, the lining of the pits does not disrupt the pre-existing ground water paths in a manner that restricts ground water flow from interacting with the South Platte River. Figure 3 indicates that ground water upstream from the pits flows in a northeastern and eastern direction to the South Platte River and that ground water to the west and downstream from the pits flows in a northern and then northeastern direction around to the pits to the South Platte River. Figure 4 indicates that ground water flow upstream from the pits is unaffected with similar northeastern and eastern flows to the South Platte River and that ground water flow to the west and downstream from the pits is also unaffected with similar flows to the north and then northeast towards the South Platte River. The modelling suggests that the lining of the pits does not interfere with ground water flows and their ultimate interaction with the South Platte River and that subsurface drains installed around the pits to maintain ground water flow paths are not necessary.

Summary

- A MODFLOW model was developed and utilized to estimate the potential impacts of the lining of the Stage 7A and 7B gravel pits at the Morton Lakes site on the local ground water system including potential changes to the ground water elevations and ground water flow paths in the vicinity of the pits.

- Figures 2 presents the modeled changes in water level elevation associated with the gravel pit lining.

- Figure 3 presents the pre-lining ground water elevations and flow paths and Figure 4 presents the post lining ground water elevations and flow paths.

- Lining of the pits may result in mounding of as much as approximately 1.3 feet in areas around the pits and shadowing of as much as approximately 2.0 feet on the downstream side of the pits. Based on the depths to water indicated by the existing monitoring wells and the modelling, ground water will not be exposed as a result of pit lining. Accordingly, no additional infrastructure (including subsurface drains) is required to address ground water elevation changes resulting from mounding and shadowing around the pit liners.

- The lining of the pits does not significantly change ground water flow paths nor restrict ground water flow from interacting with the South Platte River. The proposed gravel pit lining, therefore, does not impact local ground water flows including return flows associated with any nearby existing recharge projects and no additional infrastructure (including subsurface drains) is required to address any potential changes to ground water flow paths around the pits.

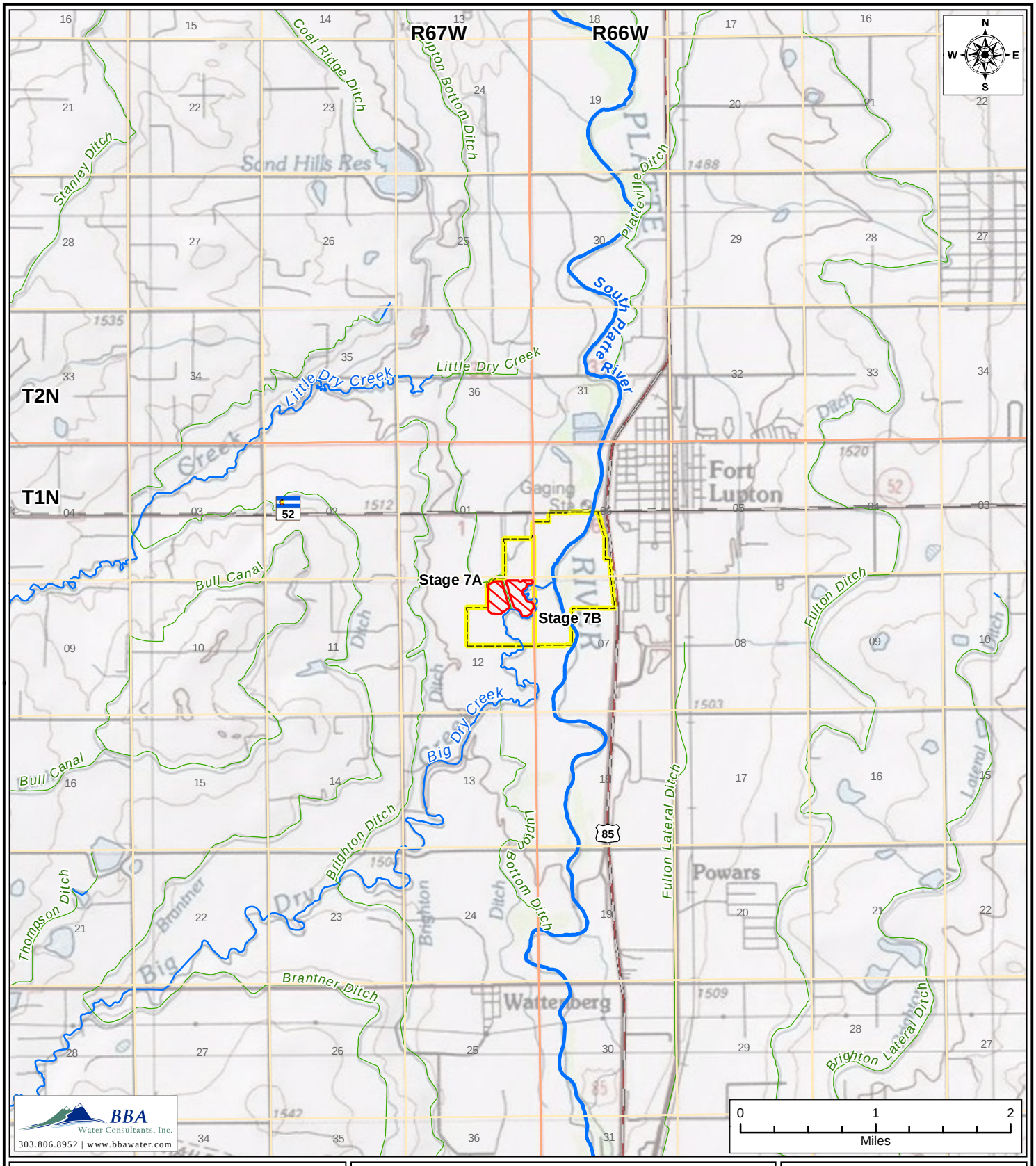


Figure 1
Brannan Sand and Gravel Company LLC Morton Lakes Stage 7A and 7B Gravel Pits General Location Map

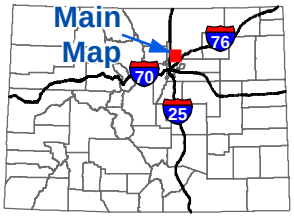
Date: 12/8/2022 | Job No. 0430.08

Legend

- Mining Stage 7A and 7B
- Morton Lakes Mine

Data Source: CDSS, CDOT, BLM, USGS

COLORADO



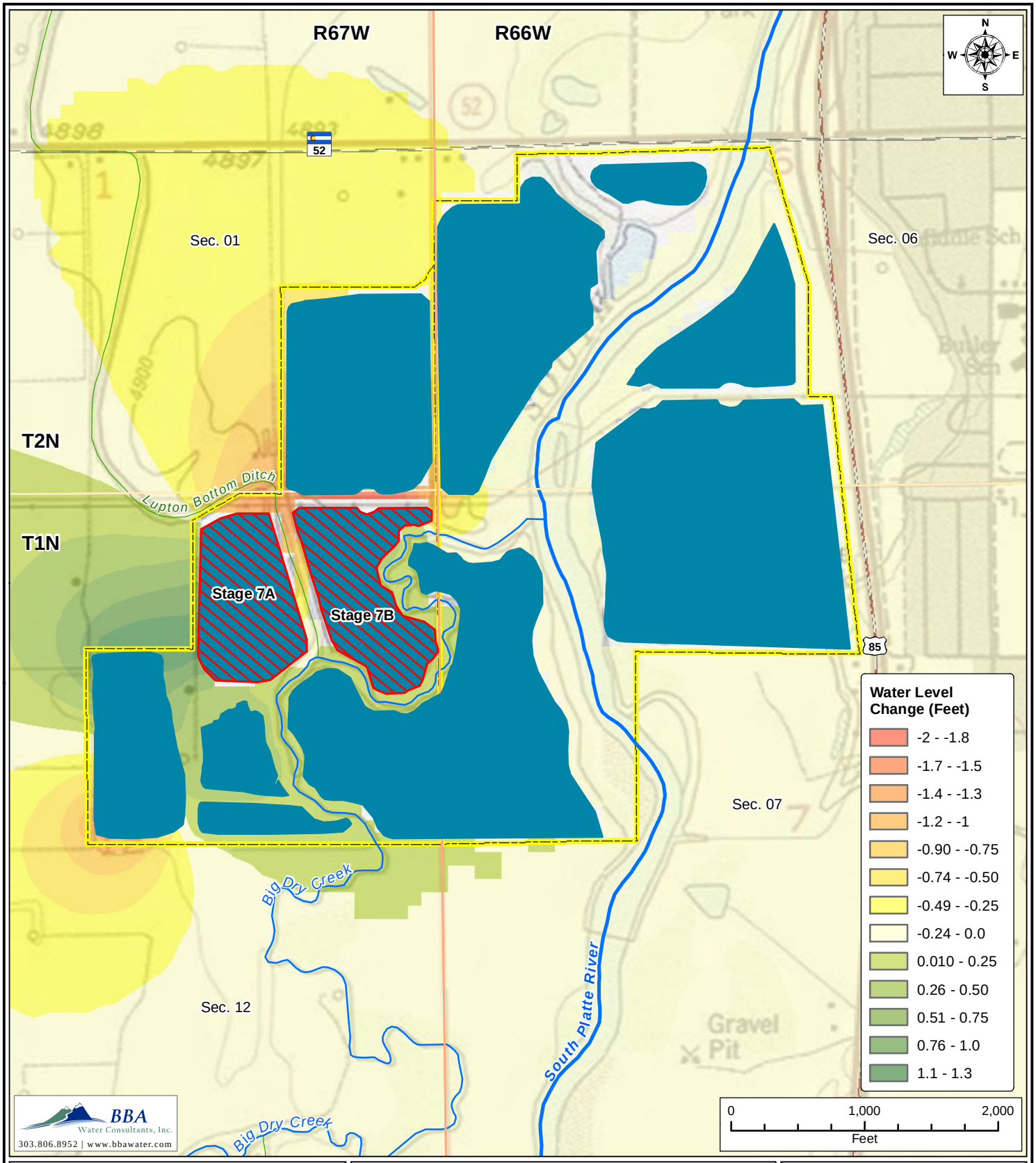


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Figure 2
Brannan Sand and Gravel Company LLC Morton Lakes Stage 7A and 7B Gravel Pits Water Level Effects

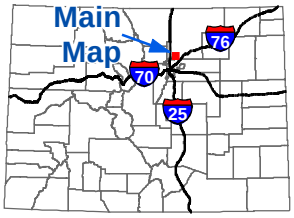
Date: 12/19/2022 | Job No. 0430.08

Legend

- Mining Stage
- Mining Stages 7A & 7B
- Morton Lakes Mine

Data Source: CDSS, CDOT, BLM, USGS

COLORADO



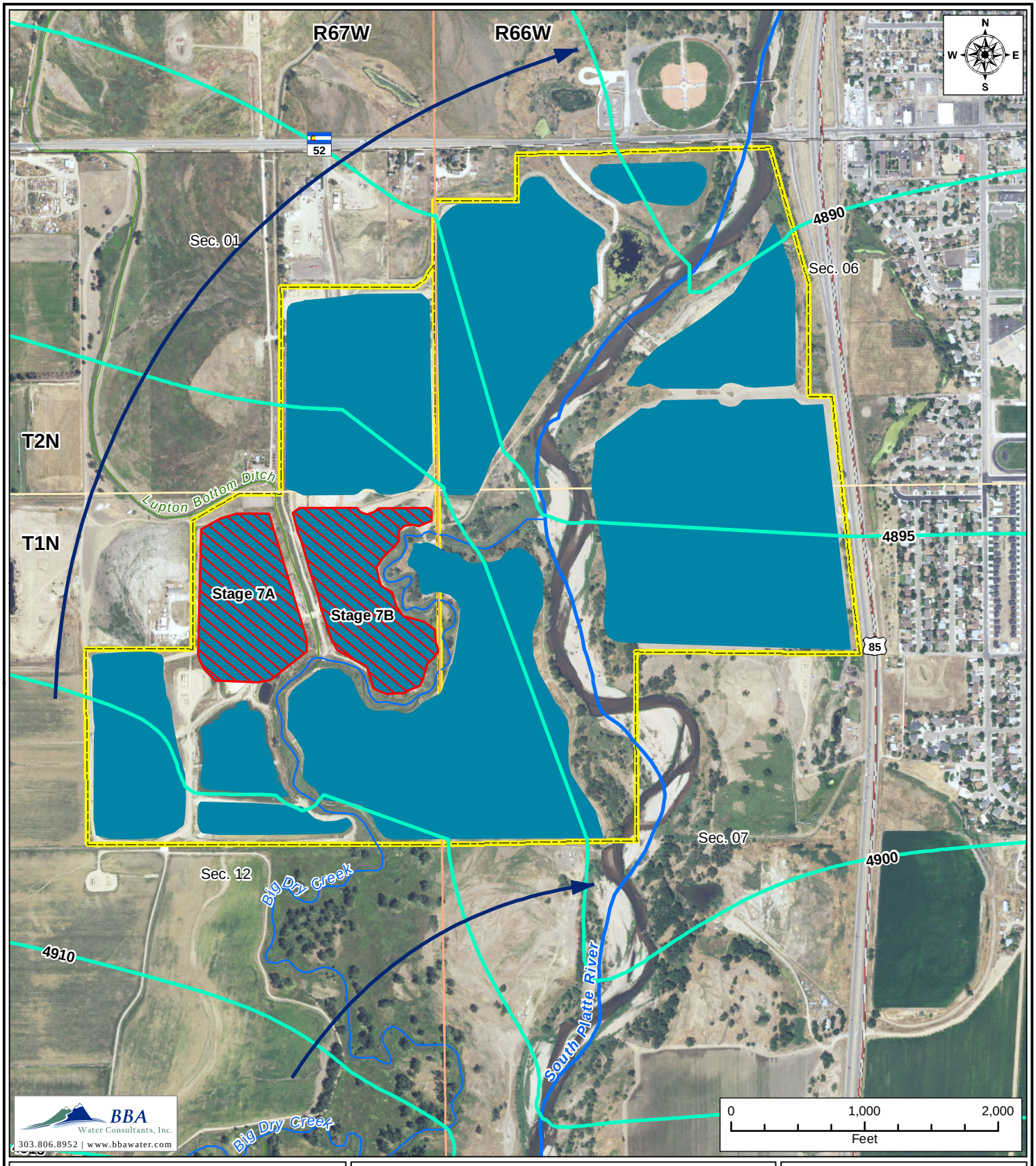


Figure 3
Brannan Sand and Gravel Company LLC
Morton Lakes Stage 7A and 7B Gravel Pits
Pre-lining Water Level Elevation

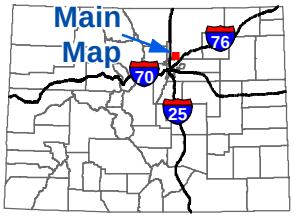
Date: 12/19/2022 | Job No. 0430.08

Legend

- Water Level 5-ft. Contour
- General Ground Water Flow Path
- Mining Stage
- Mining Stages 7A & 7B
- Morton Lakes Mine

Aerial Phot Date: 7/26/2021 NAIP USDA
Data Source: CDSS, CDOT, BLM, USGS

COLORADO



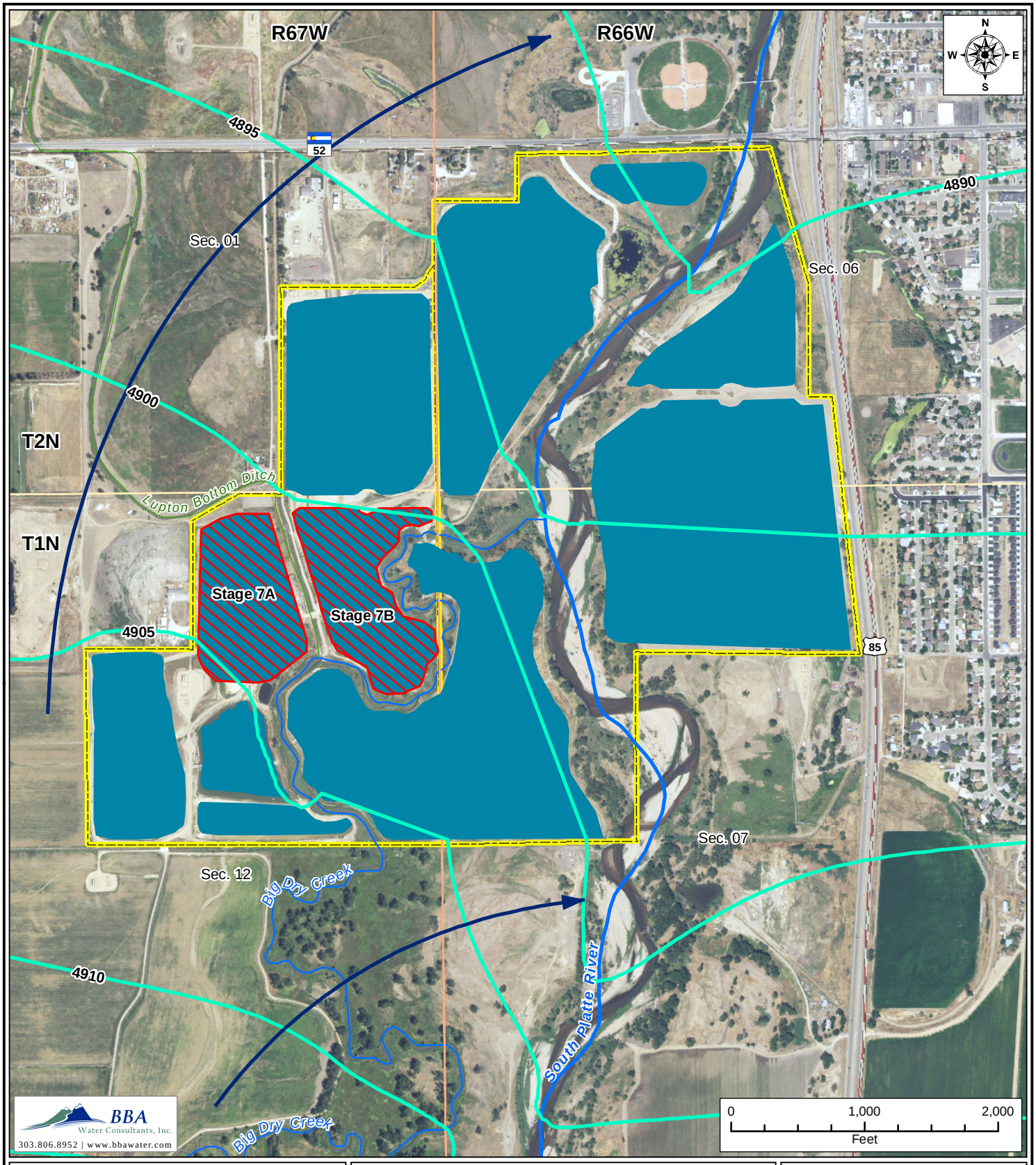


Figure 4
Brannan Sand and Gravel Company LLC
Morton Lakes Stage 7A and 7B Gravel Pits
Post-lining Water Level Elevation

Date: 12/19/2022 | Job No. 0430.08

Legend

- Water Level 5-ft. Contour
- General Ground Water Flow Path
- Mining Stage
- Mining Stages 7A & 7B
- Morton Lakes Mine

Aerial Phot Date: 7/26/2021 NAIP USDA
Data Source: CDSS, CDOT, BLM, USGS

COLORADO